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Improvements in Cannon.

On this subject Captain Blakely, R. A., in an article published in the London *Artisan*, states that "a 32-pounder is the limit of cast iron guns of the present shape, any larger than that being unsafe with a full charge." In reference to cannons of large caliber, the shot can be carried to a greater distance, and do more execution than small balls, because the weight of the ball is greater in proportion than the surface of resistance to the air. Thus a 16-inch shot presents sixteen times the surface of resistance of a 4-inch shot, but it weighs sixty-four times as much. Large guns, however, require to be made stronger than small ones, large shot taking a longer period of time to acquire its velocity, therefore the pressure of the powder on the gun remains longer. The *time* that great pressure is exerted on any material is an important element, to which too little attention has been paid in submitting bodies or instruments to severe tests of strength. A body may bear a certain pressure for one second, which if continued for one minute would destroy it. This is doubtless the case with cast iron, of which material cannon are made.

Captain Blakely recommends that cannon of large caliber (say 10-inch) be formed of the same shape they are at present, but that the outside, at the breech, be strengthened with two layers of thin wrought iron cylinders put on at a bright red heat and hammered. One gun of this description made by him stood 447 rounds with double charge, and 158 rounds loaded to the muzzle. R. Armstrong, of Newcastle, England, has made a cannon of a solid steel center, with bar iron coiled round it and welded, which has stood thousands of rounds. Captain Blakely believes that, for very large cannon, a good plan of construction would be with a cast iron cylinder center, and either rod iron wound round it at a great heat and welded layer over layer, each in cooling taking a permanent strain, or else substitute strong iron wire wound round it at a high heat, each layer having a greater initial strain than the one under it. In this manner all the fiber is laid in one direction, and the outside takes its share of the strain. The subject of heavy ordnance is now exciting much attention among engineers of gunnery and others. The foregoing views, in our opinion, deserve general attention from all interested.

Alloy of Chromium.

In the *Comptes Rendus*, it is stated that M. Fremy has lately obtained an alloy of chromium and iron, by reducing chromate of iron with charcoal under a high heat in a crucible. The alloy, it is stated, resembles brass in appearance, and is very hard.

JENKINS' SHEEP SHEARER.

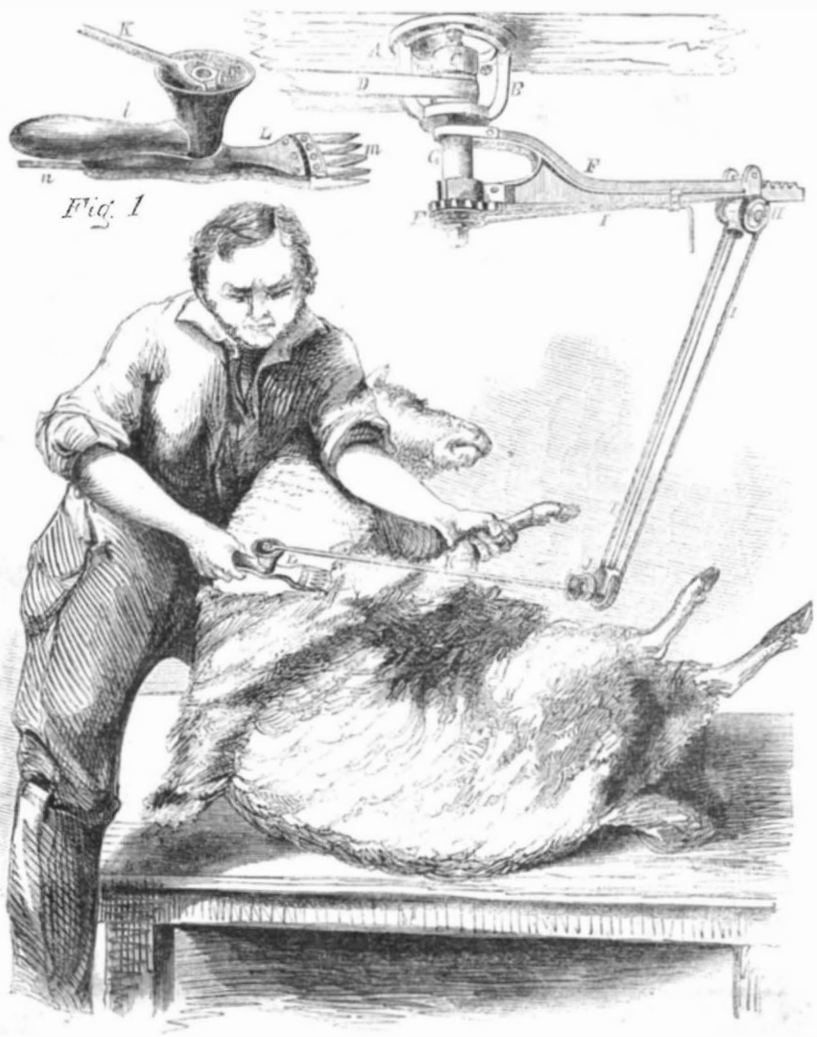

Fig. 1

One of the oldest materials used in the manufacture of fabric is the wool and hair of animals; and although at first the wool would be taken from the dead animal, it was not long before the living one was robbed of its natural clothing to protect our more tender bodies from the atmosphere's changes. The scissors or shears used for this purpose were very primitive indeed, being only two blades and a spring back; and with this simple implement sheep have been sheared for thousands of years past; it is but lately that a new implement has been introduced which can be worked by power, thus leaving the operator all his strength to manage the sheep and guide the shears.

Our engraving (Fig. 2) represents a sheep being sheared by one of these machines, which is suspended from a beam, A, and consists of a frame, B, carrying a fast and loose pulley, C, turned by the belt, D, to which motion may be given by any convenient means. From the frame, B, a short shaft, G, descends, carrying the arm, F, which can be moved around upon it, and is free to be accommodated to the wants of the operator. From the end of F is suspended by a rack the pulleys and shaft, H, to which is attached the shaft, K, by an universal joint at J, carrying at its extremity the knife and handle, L. Motion is communicated from D by a spindle passing through G, having a pulley, E, at its extremity, which imparts motion to the cord, I, and thus by turning the shaft, K, through the pulley and universal joint, J, gives motion to the knives, *m*, in L, by the universal joint, *k*, as seen in Fig. 1, which is an enlarged view of the cutter, knife, or shears, L. *l* is the handle, and *m* the knives, which move against each other by means of the apparatus above described, and *n* is a stop for regulating the motion of the cutters. In the process of shearing, the sheep is usually laid upon a table, with its head under the operator's left arm, while with the right he governs and guides the shears. By the construction of this machine it will be seen that the shears can be guided to any inequalities of the sheep's body; and there is little doubt that it is a good and convenient labor-saving machine.

This is the invention of J. V. Jenkins, of Detroit, Mich., and was patented by him the 8th of September, 1857. All further information can be obtained by addressing as above.

Divisibility.

This is a property possessed by all bodies, and means their capability to be separated into parts.

It was formerly a question among philosophers whether matter was capable of being divided *ad infinitum*, or whether there was a limit beyond which matter could not be divided. The question is incapable of direct solution, and fortunately science does not require that it should be known; but the extent to which subdivision has been carried in the arts is prodigious. In the gilding of buttons, five grains of gold, which is applied as an amalgam with mercury, is allowed to a gross; so that the coating left must not be more than the 110,000th part of an inch in thickness. If a piece of ivory or white satin be immersed in a solution of nitro-muriate of gold, and exposed to a current of hydrogen gas, it will be covered with a surface of gold not exceeding the ten-millionth of an inch in thickness.

A single grain of blue vitriol will give an azure tint to five gallons of water. In this case the copper must be attenuated ten million times, and yet there is sufficient in each drop of water to give it color. Odors are capable of still further diffusion: a single grain of musk has been known to scent a room for twenty years.

Animal matter likewise exhibits many instances of wonderful subdivision. The milt of a codfish, when it begins to putrify, has been estimated to contain a billion of perfect insects, so that thousands of these little lives could be lifted on the point of a needle. One of the infusorial animalculæ found in duckweed is ten million times smaller than a hemp seed; and another, discovered in ditch water, appears in the field of a microscope a mere atom endowed with sentient life, and millions of them play, like sunbeams, in a single drop of liquid.

Soluble Glass Soap.

At a recent meeting in Berlin of the Association for Promoting Industrial Arts in Prussia, H. Wichgraf reported the results of a trial that had been made with the silicate of soda (soluble glass) as a substitute for soap in washing clothes at the prison of Spandau. At this place 5,936 articles of clothing are washed every week. The cost of soaking these with soap amounted to about $5 94, but with the silicate only $1 76. The linen is first steeped for twenty-four hours in a mixture of one pound of the silicate of soda to ten gallons of water, then it is washed with common soap suds rinsed in clean water and dried. The steeping of linen clothes in an alkaline or soap solution prior to washing in the usual manner, affords time for the grease and dirt in them to unite with the alkali or soap, they therefore require but little rubbing and labor afterwards. Clothes treated in this manner involve less labor in washing than by the old method, without steeping. A great number of persons in our country pursue this system; still it is not a universal practice.

Platinum.

This metal, which is rather heavier than gold, is of a greyish white color, and is capable of receiving a very fine polish. The tenacity of pure platinum is almost that of iron, and for all practicable purposes it may be regarded as infusible; like iron, it yields to the hammer, and can be welded at a white heat. None of the simple acids will attack it, and therefore it is used to make vessels for their manufacture, its only drawback being the great expense. It is dissolved by a mixture of nitric and muriatic acids. When in an extremely divided state, platinum has a peculiar property of absorbing great quantities of gas, and also of igniting and becoming red hot in a stream of hydrogen. Platinum was not known in Europe until the middle of the last century, although it was known long before on this continent, where it had received the Spanish name of *platina*, or *little silver*. It is found in Peru and Russia, which last country affords about one thousand pounds annually, and about six hundred pounds are given to the world every year by Borneo.

Ground Nuts.

These nuts are produced underground by various plants, chiefly shrubs and umbelliferous plants, while in China they come from the common vetch.

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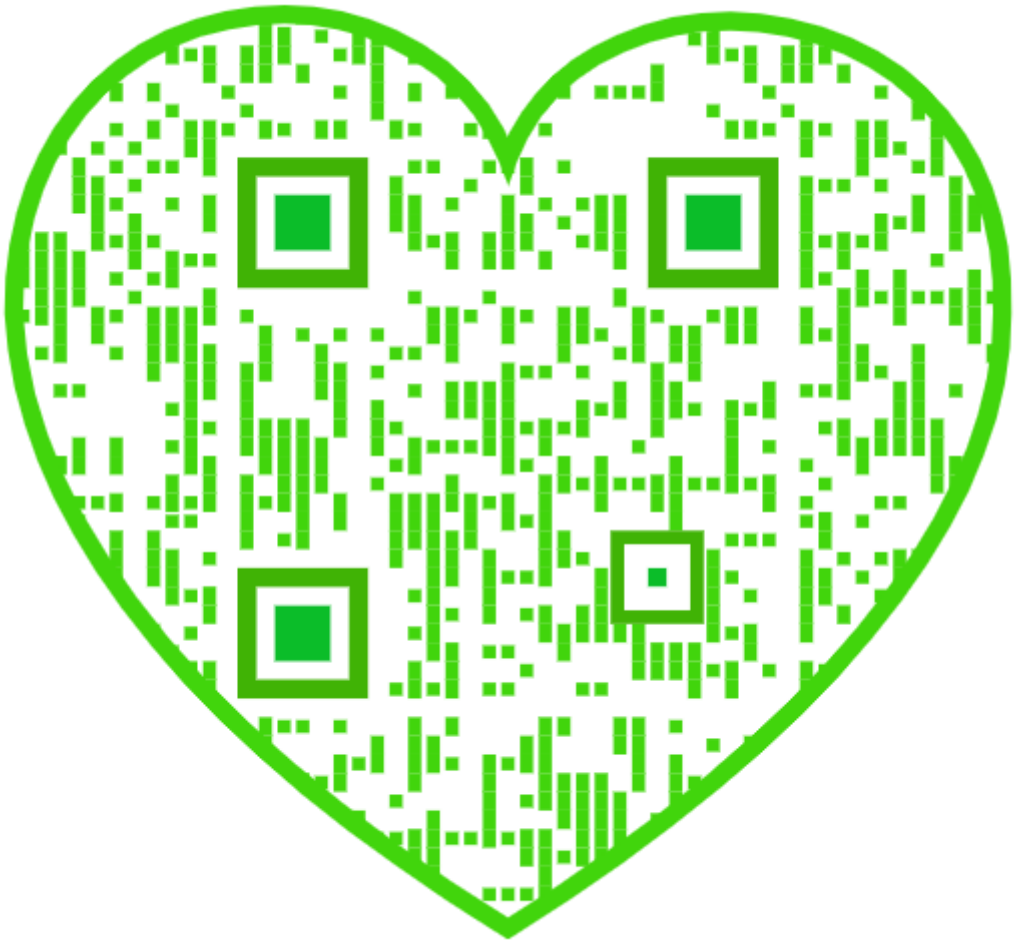

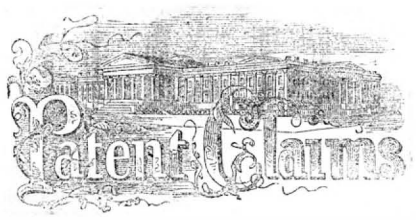

Issued from the United States Patent Office

FOR THE WEEK ENDING DECEMBER 22, 1857.

[Reported officially for the Scientific American.]

PREPARING FIBROUS SUBSTANCES FOR SPINNING—James Aperly and William Clissold, of Dodridge, Eng. Patented in England December 4, 1856: We claim the means described for conducting the roping or sliver from one preparing machine to the other, and laying the roping or sliver in parallel lines on the feed bands, aprons or tables of preparing machines.

WASHING MACHINE—Henry L. Bridwell, of New Albany, Ind.: I claim the combination of the corrugated cylinder, A, with the single oscillating, self-adjusting knuckle, B, when arranged in the manner set forth and for the purpose described.

CLOCKS—Robert P. Cunningham, of Eastford, Conn.: I claim first, Looped or slotted spring pallets acting tensively from the faces of the swing wheel teeth, S.

Second, I claim the combination of the tensive pallets and swing wheel teeth, either with or without the stops, d d, or with the stops, i i', for the purposes shown in manner as set forth, or substantially their equivalents.

EXTENSION TABLES—Edwin A. Curley, of Westport, Conn.: I claim constructing the slides, C D, of sheet metal, corrugated and bent by any proper means, so as to form tubes provided with longitudinal dovetail tongues and grooves by which the tubes are connected and allowed to slide longitudinally, as and for the purpose set forth.

[For a further description of this, see another column.]

NUT MACHINE—J. C. Day, of Jersey City, N. J.: I claim the arrangement and use of the cutting die, a, the compressing dies, g h, the punches, c d, and the finishing and discharging die, b, when constructed in the manner and operated in the order set forth.

I also claim the arrangement of the projecting under side or bottom, f, of the die box, in combination with the feeding standard, C, shear-edged die top, e, and dies, a b, in such a manner that the nut bar is fed into the machine, the nuts cut therefrom, and finally discharged from the machine without the employment of any other means except the ordinary or otherwise necessary motions of the two dies, a b, substantially as described.

I also claim the arrangement of the bearing, k k, with sliding wedges, i i, which are adjusted by screws, j j, or their equivalents, for the purpose of accurately adjusting the movements of the toggle levers and links, as described.

I also claim the arrangement and combination of the sectors, R S, and cam, L, in the manner and for the purpose specified.

TURNING THE BAND PORTIONS OF CARRIAGE HUBS—Zina Doolittle, of Perry, Ga.: I do not claim the exclusive use of any of the parts taken as parts of the machine described and shown, but only in so far as the same is used in combination, for the purpose of my invention.

But I claim the exclusive use and combination of the strap wrench, D, the handle, A, and the sliding rest, C, with the cutter, H, the whole arranged and shown for the purpose set forth.

SHOVEL PLOWS—David Eberly, of Waynesville, O.: I claim securing the shares, E E, to the beam, A, by having the upper ends of their bars, D, fitted in the bars, C, the bars, D, also passing through the loops or eyes, F, of the bars, G, and secured therein by keys, f', the bars, G, being secured to the beam, A, as shown, and the whole arranged as and for the purpose set forth.

[These plows can be adjusted at a greater or less depth in the ground, and may also be arranged to throw the soil either off or on the hills.]

WINE AND CIDER PRESS—John Eiberweiser, of Cincinnati, Ohio: I claim the peculiar construction and arrangement of the platform, and the double box on a wine and cider press, constructed in such a manner as described.

CASTING HINGES—Nicholas A. Fenner, of Providence, R. I.: I do not claim generally the casting of a wire into the center of the joint of a hinge, as wires extending right through the joint have been inserted in the process of molding and casting.

Neither do I claim the casting of pivots or teats on certain of the knuckle pieces, to be received into recesses in others of the said pieces.

But I claim the employment of a separate pin for each core, when the cores are molded upon the pins, and the latter inclosed within the hinge of the casting, as described.

[We have noticed this invention in another portion of this journal.]

AIR TUBES OF FIRE-BOXES IN STEAM BOILERS—Benjamin L. Griffith, of Hazelton, Pa.: I claim the placing of air tubes within the water tables or series of water tubes, as described.

WASHING MACHINE—George Hall and John Fordyce, of Morgantown, Va.: We are aware that aprons have been used for carrying up the clothes to the washing apparatus, and that clothes have been washed between aprons. These we do not claim.

But we claim, in combination with the rubber, K, the apron, h, attached to the spring, N, at one of its ends, and to said rubber by its other end, and passing underneath the roller, m, for the purpose of turning the clothes over and over at each operation of the rubber, as set forth.

POTATO DIGGERS—Jacob E. Hardenbergh, of Fultonville, N. Y.: I am aware that shares and gratings or riddles have been employed for digging or plowing up potatoes, and separating them from the earth, and I do not claim such parts separately considered, and irrespective of the rotating arms.

But I claim the combination of the share, P, grating, Y, rotating arms, A', arranged as shown, or in an equivalent way, to operate as and for the purpose set forth.

[This is described on another page.]

CULTIVATORS—A. W. Hawley, of Milan, Ohio: I claim the movable fender, K, adjustable arm, J, and movable brace, B, with the peculiar shaped share, E, when arranged as set forth, and for the purpose of protecting the plant from injury, as specified, and for changing the share and fender to the right or left of the frame, in the manner and for the purpose substantially as specified.

TREATING PHOTOGRAPHS AND OTHER PICTURES—Ezekiel C. Hawkins, of Cincinnati, Ohio: I claim giving the front surface of the glass tablet which has an image or picture finished on its back surface, a semi-opaque and granular appearance, and consequently producing an atmospheric relief and additional painting surface, by the application of varnish, wax or other similar substance to the front surface of the glass tablet, as described.

BEDSTEAD SLATS—Samuel Hickok, of Buffalo, N. Y.: I claim two laths, A and B, placed parallel with each other, and one above the other, and connected or fastened together at or near the center, constructed and used with or without the spiral springs, substantially as described.

RAILROAD SNOW PLOW—Andrew Hotchkiss, of Sharon Valley, Conn.: I claim first, The employment of a plunger, composed substantially of a frame, D, and share, E, which is moved back out of the way, when the machine is driven into the snow to receive a load, but which may be pushed forward to force out the snow when unloading, the whole consisting a snow plow and excavator capable of being directly loaded and unloaded by the force of the locomotive.

Second, The combination of the cutting frame, H, with the frame, B, as described, so that after the machine has been run into the drift and filled, the cutting frame, H, may be swung over in front, and made to cut down through the snow, thus completely detaching that portion contained in the machine from the main body of the drift.

[Full particulars of this invention will be found in another column.]

SEWING MACHINES—George W. Hubbard, of West Meriden, Conn.: I claim the forked needle constructed and operating as described, to enchain the loops on the opposite side of the cloth or other material to that on which it enters.

[This improvement consists in the use of a forked needle, which pushes the cotton through the cloth, instead of pulling it through, as is the case with all other single-thread machines.]

CUTTING AND GRINDING CORNSTALKS—William G. Huyett, of Williamsburgh, Pa.: I claim combining an inclined grinding concave, G, with a cutting wheel, D, and disk, e, in the manner and for the purposes as described.

[By a simple combination of mechanism, consisting of a cutting wheel, toothed cone, and concave and semi-circular disk, operating together, the cornstalks are ground into a fit state for fodder.]

MACHINE FOR ROLLING CORNICE—Asa Johnson, of Cairo, N. Y.: I claim the arrangement of the series of rollers, I a J a and K a, guide, n, and rollers, h and h', and die, n', for the purpose of forming sheet metal into cornice and gutters for buildings while hot, and passing it through the machine in boiling oil as described, and for the purposes set forth.

HAND PRINTING PRESS—J. M. Jones, of Palmyra, N. Y.: I claim first, The arrangement of the various parts, so that the lever, K, can be operated at right angles to the curved bar, B, and inking bar, D, suspended on the shaft, H, in the manner and for the purposes set forth.

Second, I claim, suspending the bed, J, on the lever bar, B, in the manner and for the purposes set forth.

DYNAMOMETER—George Juengst, of New York City: I claim the connection of the loose pulley, B, with belt, R, the support, C, with the spring, g, sliding frame, D, with ring, F, and the connection of F with disk, L, by lever and ripping pawl, and with a counting apparatus, or their several equivalents, by which arrangement the amount of working power is registered for the whole time of its action, substantially in the manner as set forth.

SCREW-CUTTING MACHINE—William Kenyon, of Steubenville, Ohio: I claim first, The combination of dies which have an angular cutting extension or shoulder, e, on their front face, with the eye screw bolts, f h, and a chuck, which has straight radial grooves in its face, as and for the purposes set forth.

Second, I claim providing the peculiar oil reservoirs in the front of the chuck, between the cutting dies, in the manner and for the purposes set forth.

Third, I claim the face plate, consisting of a short hollow cylinder, with openings in its periphery, as and for the purposes set forth.

REFINING IRON—William Kelly, of Lyon County, Ky.: I claim first, Conducting the blast down through the liquid iron to near the bottom of the hearth by the tuyere pipe, C, substantially as and for the purposes set forth.

Second, I claim refining and decarbonizing crude iron simultaneously in the hearth of a blast furnace, and in an adjoining chamber having communication therewith, when the blast enters directly into but one of either of the chambers, as and for the purposes set forth.

GLASS KNOBS FOR DOORS—Charles D. Kellogg and William L. Coan, of Boston, Mass.: What we claim consists in arranging on the bottom of the cavity, e, a plate or disk of foil, in combination with arranging an annulus of foil around the mouth of the cavity, and against the glass knob, as specified.

HYDRAULIC VALVE—Alonzo R. Ketcham, of Buffalo, N. Y.: I do not claim the combination of the screw, D, geared sector, C, and valve, B, when broadly considered.

But I claim the arrangement of the chamber, F, on the pipe or cylinder, A, for the purpose of protecting the sector and valve, and to allow of a proper movement thereof, the same being operated by the screw, D, or equivalent, as described.

COTTON SEED PLANTERS—Lorenzo D. Law, of Henderson, Ga.: I claim the employment of the vibrating agitators, C C, each having their radiating arms arranged with respect to each other, as set forth, in combination with the longitudinal slot, E, at right angles to the axis of the radiators, as set forth.

FURNACE FOR TEMPERING SCYTHES—John E. Layton, of Pittsburgh, Pa.: I do not claim the arrangement of the body of the furnace, nor of the introducing of a current of air under the grate, as these are not novel, and have been used before.

But I claim, first, Constructing the top of a furnace in such a manner that the same, or a portion, b b, of the same, is curved or shaped so as to conform with the curve or shape of the edge of the article to be hardened, and providing in the top (thus shaped) an opening, C C, or a number of such openings, as and for the purpose set forth.

Second, I claim providing in the top of the said furnace, an opening, f f, or a number of such openings, of such a shape as to conform with the curve or shape of the article to be tempered, substantially as and for the purposes described.

Third, I claim providing on the top plate of the said furnace, two blocks, g g, with the openings, i i, as and for the purpose set forth.

SEWING MACHINES—William H. Lazelle, of New York City: I do not claim the use of the revolving hook, to form the loop, that being found in the patent of James E. A. Gibbs, June 2, 1857, to which this is an addition and improvement.

But I claim the addition to, or conjunction with, the revolving hook of the point or piece, A, attached to the feeder, which meets the point of the hook after it has caught the loop, and prevents the loop which is formed from interfering with the next loop, or from being lost, the whole made and operated as described.

IMPLEMENT FOR CUTTING METAL TUBES—Thomas J. Lloyd, of Pottsville, Pa.: I claim the collar, A, having the stock, B, fitted loosely thereon, and secured in proper position by the flanch, a, and ring, C, the stock, B, having a socket, c, attached, in which a cutter, d, and screw, e, are fitted, and the whole arranged as shown, for the purpose specified.

[For description of this invention, refer to another page.]

ARTIFICIAL FUEL—Eugene Miannay, of New York City: I claim the composition of a new coal or artificial fuel, by the said several ingredients mixed together in different proportions, called ligno-bituminous coal, and manufactured as described, for the intended given purpose.

PUMPS—Hosea Lindsey, of Ashville, N. C.: I do not claim in this application the operating of the pistons of a pump arranged at the bottom of a well, by means of a double inclined plane, as the same was shown in my patent of 1855.

But I claim the attaching of the axis, F, of the pump cylinder, A, eccentrically to a stationary circle plate, E, in combination with the attaching of the pistons, C C, of said cylinder, to said circle plate, by means of a loose ring or collar, G, connecting rod or strap, H, and sliding frame, D D, substantially as and for the purposes set forth.

CARVING WOOD—Isaac Lindsley, of Providence, R. I.: I do not claim the use of a revolving cutter and accompanying tracer, as these have long been known and used.

But I claim first, The use in carving machines of the lift and fall motion of the tracer, for the purpose of enabling the same to trace out any design, however sharp or difficult the same may be, as set forth.

Second, I claim the bar, m, lever, R, and cord, S, in combination with the cross bar, D, in the manner and for the purposes set forth.

SAW SET—Edward Marshall, of Brooklyn, N. Y.: I claim a saw set made as described.

[A description of this will be found on page 131.]

CORN HUSKERS—David M. Mefford, of Perrysburg, Ohio: I claim first, The feed drum, A, provided with ear pockets, M N O, when used in the described combination with the knife, D, and husking peg, E, for the purposes set forth.

Second, The husking rollers, F G, constructed as described, in combination with the hinged and roughened apron, H, in the manner and for the purposes set forth.

GRINDING MILL—John R. Morrison, of East Springfield, Ohio: First, I claim hanging the bed stones, C C, on cleats or pins, r r, and operating said stones by means of said pins in slots or grooves in the frame, for the purpose of adjusting the stones, as set forth and described.

Second, I claim the combination and arrangement of the lever, G, screw, h, and sleeve, n', with the stones, C C', when arranged and operated as set forth, and for the purpose described.

Third, I claim the arrangement of the runner, C', between two bed stones, C C, when said runner has a flouring dress on one side and a chop dress on the other, for the purpose of grinding different kinds of grain and feed at the same time, as set forth.

CASTING CAR WHEELS—A. A. Needham, of Rockford, Ill.: I do not claim, broadly, a rotating mold for casting, for this has been previously used for casting pipes.

But I claim casting the wheel from two different kinds of iron—hard and soft—the hard iron to form the tread, and the soft to form the hub and center of the wheel, and properly disposing the two kinds of iron within the mold, as desired, by giving the same a rotating motion, as shown and described.

[This is described on another page.]

FEED WATER ATTACHMENTS TO STEAM ENGINES—Lewis Martin, of New York City: I claim the within described arrangement of the oscillating cylinders, D, and plungers, d, within a wheel, A, whereby the plungers, when moving outward are subjected to the full boiler pressure in every direction or held in perfect equilibrium, in the manner above described and for the purpose set forth.

GIVING MOTION TO VALVES OF STEAM ENGINES—H. O. Perry, of Buffalo, N. Y.: I claim, first, The above described method of shutting a rolling or partially rotating valve by pulling on a link so attached to it at its effect in rotating the valve decreases as the valve assumes its most desirable shut position, and tends to revolve it in the reverse direction, when the valve revolves by momentum past such position, when operated substantially as and for the purpose set forth.

Second, I also claim the above described method of operating said link by the pressure of the steam, so that the whole amount of power available in shutting shall be always proportional or very nearly proportional to the resistance for the purpose of enabling the valve to stop in the proper position under all pressures of steam, as set forth.

CASTING GAS RETORTS—Abiel Povey, of Lowell, Mass.: I disclaim the general principle of the formation of a mold, without patterns, by sweeping, or without flasks, as such is well known and forms no part of my claim.

Neither do I claim hanging cores in the cope or setting them for casting kettles in the ordinary manner, as that also forms no part whatever of my invention or claim.

But I claim my described flask, composed of the several parts, A B C, and former, H and I, constructed and relatively arranged and operated for molding the retort, and for self-centralizing and setting the core, essentially in the manner as set forth and described.

GOVERNORS FOR MACHINERY—George M. Phelps, of Troy, N. Y.: I claim causing the described centrifugal governor, or its equivalent, to regulate the rotary motion of a shaft with which the governor is positively driven by making the governor control by means of a valve the motive action of a current of air or other gaseous fluid upon a piston, or an analogous device, arranged to work the mechanical contrivance by which the speed of the said shaft to be regulated is immediately changed, substantially as set forth.

CULTIVATORS—John Righter, of Clarksburg, Ga.: I claim the employment of the pinions, e and f, when in combination with the screw shaft, b, and teeth or plows, a a, substantially in the manner and for the purposes set forth.

MACHINE FOR BENDING HORSE-SHOES—Elbridge Wheeler, of Marlboro', Mass.: I claim the described machine for bending horse-shoes, consisting essentially of the following elements in combination, or their substantial equivalents. The traveling carriage, C, the bending levers, M, and the regulating cam, o, operating in the manner substantially as set forth for the purpose specified.

APPROACH OPENING FARM GATE—C. W. Smart, of Watertown, N. Y.: I do not claim, broadly, the actuating of a bolt or catch, and the opening and closing of a gate automatically by the passing of the wheels of vehicle over levers or projections to actuate mechanism arranged for the purpose, for various plans have been devised for effecting this object. Nor do I claim the arrangement of levers and cords for withdrawing and then pulling open the gate, as in J. K. Webber's patent, 1853.

But I claim the combination of the slide bolt, F, and spring, E, arranged and actuated as shown, or in any equivalent way, so that by the withdrawal of the slide bolt, the spring will be wound up or contracted, and have sufficient strength to throw open and close the gate by the time the bolt is fully withdrawn, and the gate released.

[This invention consists in combining the catch or bolt which secures the gate, in an open and closed state, with a spring which actuates the gate, the parts being so arranged that as the catch bolt is withdrawn, and the gate released, the spring will, by the same mechanism, be wound up, and receive sufficient strength to actuate the gate.]

OSCILLATING ENGINES AND PUMPS—Gambrill Sprenkel and Thos. W. Basford, of Harrisonburg, Va.: We claim the arrangement of the pump, in such relation to the main cylinder and crank of an engine, that its pistons and valves shall be operated simultaneously with the piston and valves of the cylinder, and by the same means that actuates them.

Second, The peculiar arrangement consisting of boxes with inlet and outlet passages, C 5, C 5, hollow trunnion with two chambers, d d, formed by diagonal partition, e, and with two sets of ports c 1, c 2, c 3, c 4, substantially as and for the purposes set forth.

CLOTHES' RACKS—S. J. Russell, of Chicago, Ill.: I am aware that adjustable rotating arms forming a clothes' dryer are not new, and I do not broadly claim them. An example is seen in S. Woodward's patent, 1854, and in J. Higgins' rejected application, 1855.

Nor do I claim the hollow post or any portion of either of the above mentioned devices, nor do I claim indiscriminately the counterpoising of all descriptions of objects.

But I claim the arrangement within the hollow base, B, of a counterpoising weight, d, connected by a cord with the rising and falling rod, D, for the purpose of balancing or nearly balancing the hub, E, and arms, k, and thus preventing the sudden fall and breakage of the parts, as well as rendering them easy of operation.

I also claim as new in clothes' dryers the employment of a spring, h, attached to the base, B, and acting against the shaft, A, all in the manner and for the purposes set forth, and not otherwise.

[This invention has for its object the adjustment of the rotating frame, so that the clothes can be taken off and put on with ease.

APPARATUS FOR ILLUSTRATING CONIC SECTIONS AND THE LINES OF THE GLOBE—Forrest Shepherd, of New Haven, Conn.: I claim the combination of the globe, with an extended horizon or surface as the base or convex surface of the cone, or any other extended surface on which may be written any geographical or other exercise with the globe, and be easily wiped or rubbed off, when constructed, arranged and combined substantially as described.

I also claim the combination of the globe with the cone when the cone is made in three or more segments, and the upper segment so cut as to illustrate the conic sections, and the whole is constructed, arranged, and rendered susceptible of the various uses as described and set forth.

PORTABLE FIELD FENCE—H. T. Skinard, of Wayne, Mich.: I claim attaching or securing the fence to the ground substantially as shown and described, to wit, by means of the inclined bars or braces, D D, attached to the posts, and connected by cross-ties, E E, in connection with the stakes, F, provided with mortises and the wedges, G.

[By means of inclined braces or supports and cross-ties secured to, stakes driven in the ground a very portable fence is obtained.]

MACHINE FOR TURNING THE LEAVES OF BOOKS—F. Suter, of Brooklyn, N. Y.: I claim, first, The arrangement of the lever, H, with the described mechanism operating in the manner specified, for the purpose of taking hold of the music leaf, turning the same over, and afterwards letting said leaf loose again, and dropping down so as to pass under the same, in the manner substantially as described.

Second, I claim the fingers, 3 and 4, operating in the manner and for the purpose [redacted].

CHURN—Wm. H. Truesdell, of Elgin, Ill.: I do not claim the introduction of atmospheric air into the body or mass of cream while being agitated or churned, in order to expedite the formation of butter, for this has been previously done, and in various ways

Nor do I claim broadly the idea of adjusting the dashers in churns.

But I claim the employment of the peculiarly formed dashers, D, having air tubes, j, attached, said dashers being so made as to churn and introduce the air when turned in one direction, and presenting chambers for the collection of the butter, when the direction is reversed.

[This invention is designed to collect the small particles of butter which usually escape when a horizontal dasher is employed. This dasher is caused to slide upon its axle, and by a gentle rotation the butter is collected.]

CHURN—James Vandolah and Elias Curry, of Dillsborough, Ind.: We claim the construction of the dasher, with the rim, c, wings, d d, peripheral strips, f f, and horizontal plates, g g, arranged and operating substantially in the manner and for the purposes specified.

We also claim the arrangement of the ribs, I I, with retaining hoops, k k, or their equivalents, so as to render them adjustable and removable, substantially as and for the purposes specified.

HARVESTERS—Wm. Webber, Jr., and John Webber, of Rockton, Ill.: We claim communicating motion from the main shaft, a, of the driving wheel to the cutter blade, by means of the intermediate shafts, c d, arranged parallel with each other on opposite sides of the bearing wheel, A, in such a manner that pulleys on the after ends of said shafts may be banded to each other, and a regulating fly wheel be combined with the shaft, d, the whole being constructed and arranged for joint operation, substantially in the manner and for the purpose set forth.

CULTIVATORS—Lorin Wetherell, of Worcester, Mass.: I claim, in combination with a plow, H, the pair of revolving hoes or scrapers, having a vertical adjustment in addition to the adjustment of the edges thereof, so that the capacity of the machine may be increased with the increasing hight of the plants to be cultivated by it, substantially as set forth.

MODE OF BELTING—Benj. Chester, of New York City assignor to W. H. Burnap, of Lowell, Mass.: I do not claim an intermediate pulley, between a driving pulley and a pulley to be driven by an endless belt, when such intermediate pulley is merely a guide pulley.

Nor do I claim broadly the winding of belts several times around the peripheries of wing lasses, for the purpose of obtaining additional friction. Examples of ropes and chains thus arranged may be seen in Dingle's Polytechnic Journal, vol. 81, page 4; H. O. Nicholls' device rejected, 1845, and that of Richards & Winsor, 1854.

But I claim the arrangement and combination of a pulley, C, with the pulleys, A B, when the driving belt, after passing around the small pulley, B, is led therefrom to and around the pulley, C, thence around pulley, B, to and around pulley, A, as and for the purposes described.

[A description of this invention will be found on another page.]

METHOD OF GOVERNING THE CUT OF CIRCULAR SAWING MACHINERY—A. C. Martin and Mahlan M. Wombaugh (assignor to A. C. Martin and R. Ashcraft), of Cincinnati, Ohio.: We claim the mandrel, C, when working in governable circular joint, swivel boxes, B B, in combination with angular guide, F', and lever, E, when arranged substantially in the manner set forth for the purposes specified.

We also claim the side end or lateral swinging movement of plummer blocks, B B, when arranged substantially as set forth.

[In another part of our paper a description of this will be found.]

CROSS-CUT SAWING MACHINE—G. R. Moore (assignor to himself and C. G. Sargent), of Westford, Mass.: I claim, first, The peculiar method of hanging the inverted saw within its gate by means of the guide wheels, S, and block, r, as set forth.

Second, I claim the depressing the middle section of the horse, in the manner and for the purpose described.

Third, I claim driving the saw by means of the segment, O, and straps, N, in the manner and for the purpose specified.

Fourth, I claim uniting the ratchet wheel, y, to its shaft, by means of a friction clutch, in the manner and for the purpose set forth.

CUTTING THE ZIG-ZAG GROOVES IN THE STILES OF WASHBOARDS—O. L. Reynolds (assignor to H. F. Snow) of Dover, N. H.: I do not claim zig-zag cutting wheels as my invention, for I am well aware that they are old.

But I claim the method described of cutting or forming the grooves in the stiles or side pieces of washboards, in which corrugated metallic rubbing surfaces are employed.

[A notice of this will be found on another page.]

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LIGHTING GAS BY ELECTRICITY—Saml. Gardiner, of New York City: I do not confine myself to the particular method described of accomplishing my object.

But I claim, broadly, turning on or shutting off inflammable gas by degrees or gradually through the agency of electricity, for such purposes as before alluded to.

[This improvement will be found described in another column.]

VEGETABLE CUTTERS—Wm. Robinson, of Highgate, Vt.: I claim the employment of hooked cutters, running at different velocities on parallel cylinders, the whole being arranged and combined in the manner and for the purposes set forth.

RE-ISSUE.

AUTOMATIC GRAIN WEIGHING MACHINE—Rufus Porter, of Washington, D. C. Patent dated May 5, 1857: I claim, first, The combination of the tripping rods, S, with the valve plate, N, and knuckle braces, i and j, whereby the movement of the valve gate, L (which is operated by means of scale beams, F) causes the contents of the buckets, E, to be discharged alternately, as set forth.

Second, The knuckle braces, i and j, in combination with the trap doors, m, whereby the latter are spontaneously closed and fastened immediately after the grain is discharged, as set forth.

Third, The balance beams, F, with horns, I, in combination with valve plate, N, and catch levers, T, so arranged that the weight of grain in one bucket changes the position of the valve gate, so as to turn a portion of the current of the grain into the other bucket before the first bucket receives the quantity the second horn trips the catch, and thereby turns the balance of the current of the grain into the other bucket as set forth.

ADDITIONAL IMPROVEMENT.

SKATES—Ferdinand Klein, of Newark, N. J. Patent dated April 1, 1856: I claim casting in one piece the bar, A, heel plate, B, and loop, e', having a point, g, which assists to support the bar, A.

Secondly, I claim forming the obtuse angles, a b c, and a' b' c', of the bar, A, to prevent the stock or wood of the skate from separating, substantially as described and shown in the drawings.

DESIGNS.

TRADE MARKS ON PLOW SPRINGS, &c.—James D. Willoughby, of Pleasant Hall, Pa.

CLOCK FRONTS—Elias Ingraham, of Bristol, Conn.

COOKING STOVE—Jacob Steffe, James Horton, and John Currie, of Philadelphia, Pa., assignors to M. W. Jackson and W. H. Wooden, of Berwick, Pa.

NOTE.—The above List of Claims indicates that the times have not materially affected inventive genius, and why should they? On the contrary, we have noticed in years gone by, that when trade generally was most depressed, and mechanics were out of employment, and consequently had the smallest incomes, then it was that the business of the Patent Office was the greatest, thus proving the old adage that "Necessity is the mother of Invention." No man knows what he can accomplish until placed in some emergency, out of which he is obliged to work his way. It is so with many who have recently secured patents. They did not know they had the talent for inventing until necessity compelled them to do something for a livelihood, and as they were out of employment, they fortunately took the advice they had often read in our columns, and made an invention, got it patented, sold rights, and are now in a position to snap their fingers at the hard times.

In the foregoing list, we recognize the names of TWENTY-THREE—more than one-third of the entire number—whose patents were secured through the Scientific American Patent Agency.

Drying Bricks by Artificial Heat.

MESSRS. EDITORS—As every one now looks to the SCIENTIFIC AMERICAN for improvements and discoveries in art or science, I will give you the result of a series of experiments which I have just completed to dispense with the usual method of drying bricks by exposure to the sun—substituting in its stead a proper application of artificial heat. The process is so simple that it will ere long, I think, revolutionize the business, at least in the large cities, or where there is a market for a large quantity.

Imagine a tunnel one hundred and fifty feet long, four feet wide and five feet high, fitted with a railway and train of cars extending its entire length. The cars descend by their own gravity, having declination sufficient to give motion with a slight exertion of force. Near the mouth or entrance is a smoke stack, communicating through the floor, and near the opposite end or exit is a furnace. As the bricks are molded they are placed on the cars, each containing 180 bricks, which, when filled, are shoved into the tunnel, and thus push each other along, requiring seven or eight hours to make the passage. I have taken them out perfectly sound, and as dry as if they had been exposed to the sun for a week.

It will be seen that this method meets all the requirements. The stack being at one end and the fire at the other, a strong current of air is created running the entire length of the tunnel. The bricks first need the air rather cool—if otherwise, they would crack—and as they advance, the moisture is liberated and carried off. In two or three hours, they begin to feel the heat, but they are then partially dry, and able to bear it, and so on until they emerge from the tunnel perfectly dry, and are borne off to the kiln.

Every brickmaker will appreciate the importance of this. The business may now be carried on under cover, and free from the vicissitudes of weather. Instead of being limited to five or six months in the year, ten or eleven may be secured. There is nothing to prevent operations on this day (December 15), or, in fact, whenever the temperature is not down to the freezing point. This, of course, requires the molding to be done by a machine, as the cold clay cannot be handled.

Drying floors being no longer needed, brickworks may now be established in many a spot hitherto impracticable, as you only require room for the kilns, and a shed one hundred feet long. About twenty feet of the tunnel must be of brick; the remainder, with the smoke-stack, may be of lath and plaster, or any other cheap material. The cost of a tunnel, with the cars, &c., to turn out 25,000 bricks per day will be about $1200 or $1500, which is much less than the floors, sheds and other requisites of a yard in the present mode.

I have here given the mere outlines. Those wishing further information can address me by mail.

FRANCIS H. SMITH, Baltimore, Md.

[If this improvement secures all the objects specified by our correspondent, it is certainly of great importance to brickmakers. During the early part of last summer, the weather continued cold and wet, preventing many of our brick manufacturers from carrying on their usual amount of business. In one case known to us, the weather disabled an extensive manufacturer from fulfilling a large contract, and he was thereby subjected to a considerable loss. Had he been in possession of the above information furnished by Mr. Smith, he would have been enabled to meet his engagements with profit instead of loss to himself and others.

Eclectic.

This word is now in almost daily use, and is found on the title page of many works professing to have for their aim the advancement of true knowledge and civilization. It is derived from a Greek word which was applied to a school of philosophers who endeavored to select from the systems of various schools those doctrines which alone are true, and to present them in the form of an entire whole, calling them eclectic principles.

Pluto and Aristotle may be said to have been eclectic in their views, but the chief of ancient eclectics lived under the Roman empire, the most celebrated of them being Epictetus, who lived in the year 60, A. D., and Plutarch, who wrote a series of biographies of great men. The most striking example of a philosopher of this school in later days is M. Victor Cousin, a French professor of the mental sciences.

At the present day, when physical science has made such vast strides in the onward march of truth, it has been necessary for eclecticism to step in and act as a kind of check to prevent us from rushing into false theorizing and wild speculation; and in no branch is this more necessary than in medicine, where every new quackery which starts up around us finds some believers. It is therefore requisite for the well-being of the body, that calm and cautious men should examine the facts supporting the system thoroughly, so that any grains of truth there may be in it may be used for the good of the world, and all the chaff may be blown to the winds.

Occult Science.

The age of research and investigation in which we live has entirely done away with the chimeras of the ancient alchemists, astrologists and others of the same class, except amongst the most ignorant and degraded of the community. Yet we must not hold them in disrespect, as they were the germs of two of the noblest of our modern fields of inquiry, namely, chemistry and astronomy.

Monoliths.

This is a name given to a monument or pillar composed of a single stone. They were common in ancient times, the obelisk of Luxor now in Paris being an illustration.

Painting on Glass.

There is a common opinion that the ancient art of glass-painting is completely lost. This, however, is so far from being true, that it is now carried to a much higher degree of perfection than ever before, except in one particular color, and even that is very nearly approached to. We can blend the colors, and produce the effects of light and shadow, which the ancients could not do, by harmonizing and mixing the colors in such a manner, and fixing by properly enameling and burning them, that they shall afterwards become just as permanent as those of the ancients, with the additional advantage of superior art. In modern times, glass-painting has been carried to the greatest perfection at Zurich. The process is effected chiefly by colors derived from metals. The colors are laid on by fluxes, as soft glass and easily vitrified bodies. The colors are affixed by annealing the metals to the glass.

Recent Patented Improvements.

The following inventions have been patented this week, as will be found by referring to our List of Claims on another page:—

SNOW PLOW.—Andrew Hotchkiss, of Sharon Valley, Conn., has invented a new plow for excavating snow. It can be used as an ordinary snow plow in light snows, and when a deep snow occurs, or the snow accumulates in a cutting, one of these plows attached to the front of the locomotive will act as an excavator, and dig the snow away in blocks.

POTATO DIGGER.—A new potato digger has been invented by Jacob E. Hardenburgh, of Fultonville, N. Y., which consists in the combination of an adjustable share and grating, with horizontal and revolving arms, on a suitable framing and wheels, arranged relatively with each other, to dig the potatoes and throw them in ridges on the surface of the ground.

GALVANIC GAS LIGHTER.—This apparatus (which will be found fully described and illustrated on page 320, Vol. XII, SCIENTIFIC AMERICAN) is the invention of S. Gardiner, Jr., of New York City. It consists in placing a fine coil of platinum wire over the burner, which is made red-hot by the passage of the electric force, and the gas impinging on it becomes ignited. By this means any number of burners may be turned on and lighted instantaneously. It is a valuable invention.

EXTENSION TABLE.—This table has slides of sheet metal plate, which are bent so as to form tubes, each of which has externally a dovetail tongue on one side, and an inversely corresponding groove on the inner side, so that the tongue of one slide will fit into the groove of the other. By this means the perfect working of the slides is obtained, and the table is rendered stiff and firm; it is not likely to get out of repair. It is the invention of Edwin A. Curley, of Westport, Conn.

CUTTING SLOTS FOR STILES IN WASHBOARDS.—O. L. Reynolds, of Dover, N. H., assignor to Hiram F. Snow, of the same place, has invented an improved machine for cutting zig-zag slots in the stiles or hill pieces of washboards, to receive the ends of the corrugated sheet metal plate. It consists in having a wheel provided with a zig-zag cutting edge placed on a shaft over a bed having a longitudinal groove made in it to receive the stiles or side pieces. The wheel, as it is turned, cuts the zig-zag curves or slots in the stiles.

SAW-SET.—The class to which this saw-set belongs is that in which a punch is employed to bend or give the set to the teeth of saws. The invention consists in attaching the punch to a swinging or vibrating bar, which is operated by a cam and spring, and using in connection with it a beveled inclined bed and set screws, whereby a greater or less set may be given to the saw as desired, and the implement may be applied to the saw with the greatest facility, thus setting saws in an expeditious and perfect manner. It is the invention of Edward Marshall, of Brooklyn, N. Y.

IMPROVEMENT IN BELTING.—The object of this invention is to prevent the slipping of belts on small pulleys when driven by a larger one. It consists in leading a belt from the large pulley round the back, to and round an intermediate pulley on a third shaft; from this intermediate pulley the belt is carried back again around the small pulley to the large one. By this arrangement the smallest pulley can be driven by a large one without any danger of the belt slipping. The arrangement is the invention of Benjamin Chester, of this city, who has assigned it to V. H. Burnap, of Lowell, Mass.

CUTTING METAL TUBES.—This invention consists in having a metal collar provided at one end with a flanch, which fits in a recess in a circular stock fitting loosely on the collar. The opposite end of the collar has a ring secured upon it, by a screw passing through them both, and pressing against the tube to be cut, which is fitted inside the collar. The stock is fitted and works between the flanch and ring, and a cutting tool is placed in a socket attached to the stock. The tube is cut by rotating the stock on the collar, the cutter being fed to its work by a screw worked by hand. It is especially applicable to cutting gas tubes, and is the invention of T. J. Lloyd, of Pottsville, Pa.

CASTING HINGES.—The object of this invention is to produce a hinge in which all the advantages of the best drilled and wired hinges are obtained, and which is, in some respects, superior, at a cost scarcely exceeding that of the pivot hinge, which is formed by casting the two parts together, with teats and corresponding recesses at the center of the joint. The invention consists in the introduction of a wrought iron pin, or pins, into the center of the joint, by the molding and casting process, in such a manner that they extend through the knuckle or knuckles of one leaf of the hinge, and protrude so as to form pivots entering into, but not passing through, the knuckles of the other half of the hinge. It is the invention of Nicholas A. Fenner, of Providence, R. I., and assigned to the N. E. Butt Co., of this city.

CIRCULAR SAW MACHINE.—This invention consists in attaching the saw guides to a forked or V-shaped bar, which is fastened to a collar on the saw arbor, and having the pillar blocks which receive the bearings of the arbor pivoted to the frame; the bearings being fitted in the pillar blocks in a peculiar way, and the outermost pillar block and bearing being rendered adjustable longitudinally, whereby a longitudinal play or movement is allowed the saw arbor, and consequently a lateral play is allowed the saw, so that it may conform or give to the spring of the log; and the "dip" of the saw is regulated, or more or less "clearance" can be given it, as may be required. It is the invention of A. C. Martin and Mahlan M. Wombaugh, of Cincinnati, Ohio, who have assigned it to A. C. Martin and R. Ashcraft, of the same place.

CASTING CAR WHEELS.—A. A. Needham, of Rockford, Ill., has invented a new method of performing this operation, by which he overcomes the difficulty hitherto attending the casting of perfect car wheels, in consequence of the unequal cooling of them, produced by casting with a chill, in order to harden the periphery. Wheels cast with a chill are liable, from the cause above alluded to, to crack, and the iron prevents it from assuming that crystalline structure of cast iron which is best adapted for strength. The invention consists in using two different kinds of iron, hard and soft, and having the mold placed within a revolving flask, the melted hard iron being first poured into the mold, which, by centrifugal force, will be pressed hard to the edge of the mold, thus forming a periphery of hard iron; the softer iron can be afterwards poured into the mold, to form the body of the wheel, and the whole being allowed to cool gradually, the wheel will contract equally throughout its mass.

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New Inventions.

Conversion of Pig Iron into Steel and Malleable Iron.

It has oftentimes been a subject of remark that wrought iron tubes employed in the production of *sodium* are never converted into cast iron, although the carbonate of soda from which sodium is distilled contains a large amount of carbon. M. Tissier, of Paris, has recently made some experiments in connection with this subject, and has ascertained that wrought iron is not affected in any way by the carbonate alluded to, even at a very high temperature. He tried the action of the carbonate of soda upon malleable and cast iron at the melting point of the latter, and found that while the malleable iron was not affected, the cast iron was deprived of its carbon and silicon, and converted into malleable iron. M. Tissier also operated on gray pig iron containing six and a half per cent of silicon, and graphitic carbon. The iron was heated with an excess of carbonate of soda at a bright red heat for several hours. It boiled up, evolving bubbles of carbonic oxyd, and when this action ended, the iron was withdrawn and immersed in water. The result was, that this iron, formerly so brittle, could now be forged under the hammer and welded; its granular structure had disappeared—it had become fibrous crystalline. The action of the carbonate, as reported in the *Le Technologiste Juillet* removed all the sulphur and phosphorus from the iron, as well as the silicon. M. Tissier has only made experiments with small masses of iron; and although the results of his efforts are interesting as a matter of science, yet practically they are of little value, because the metal so treated, although changed from pig to malleable and wrought iron becomes too porous—it was full of cavities. Something practically useful, however, may yet be derived from the discovery. It is for this reason we direct attention to it.

Improved Window Blind.

In climates where, during the almost tropical heat of summer, every breath of air is regarded as a blessing, and every stray breeze must be caught to cool us in our parlors and rooms, the ordinary close shutter is worse than useless, as it excludes all air and hinders ventilation. The blind that we ordinarily adopt, which can be closed to keep out the noonday sun and yet give vent to air, is one of the most striking instances of perfect adaptability with which we are conversant. As they are everywhere used, it may not be uninteresting to say a word or two concerning their history and journeyings. Venice claims the invention of them, and to this day, everywhere, they are called Venetian shutters; from that city of refinement they were spread over the whole continent of Europe, and were brought to our Southern continent by the Spaniards, and to our Northern latitude by the Dutch, the climate of England rendering their use unnecessary, and although applicable anywhere, in that country they are seldom seen. They are almost universal now in every city of the Southern hemisphere, and form a distinct feature of likeness between all cities where warm summers are felt.

In the good old times, when robbery and housebreaking were not quite so common, these blinds made of wood were an all-sufficient protection; but now, the housebreaker's art having advanced with everything else, the method of fastening them has been found unsafe, and the improvement we are about to describe consists in making the fastening more secure, so that they are less liable to be broken open, and in constructing them of iron, thus rendering them fireproof.

In our engraving, Fig. 1 represents a window, with the blinds attached, one being open to show the fastening arrangement, and Fig. 2 a view of the slats, illustrating their method of attachment to the frame. A is the frame, having the hollow tubes, B, running up each side, better seen at Fig. 2 in a slot in which *b*, the slat, C, is held by a wire, D, running the whole length of the tube. By withdrawing this wire all the slats are released, thus affording great facilities for repairing. The method of fastening them close or keeping them open is seen in the two figures. The slat has a piece, *c*, worked on it or left in cutting it out, which fits in a slot in a central tube, E, connecting all the slats, and through a hole in *c*, the wire, *e*, passes, attaching the slats to E in the same manner that they are attached to B. This tube, E, is also provided with a sliding wire, F, and two small slots, *f* and *g*, which receive the bent wire, G, that is attached to the side of the frame, and can move in it so that when the slats are to be open it will fit into the lower slot, *g*, as seen in the lower half of the blind, and when they are to be kept shut, it will fit into *f*, as seen the upper half, the sliding wire will be pushed over it, and it is most securely fixed. The principle of fastening and attaching the slats can be equally as well applied to wood as iron, the advantage of iron being that it is fire and burglar proof.

It is the invention of A. M. Cochran, of 280 West Thirty-fifth street, New York, and was patented by him through the Scientific American Patent Agency, on the 3d of February, 1857. A bronze medal was awarded to the inventor at the last annual Fair of the American Institute held in the New York Crystal Palace, where it was exhibited. He will give any further information that may be desired.

COCHRAN'S WINDOW BLIND.

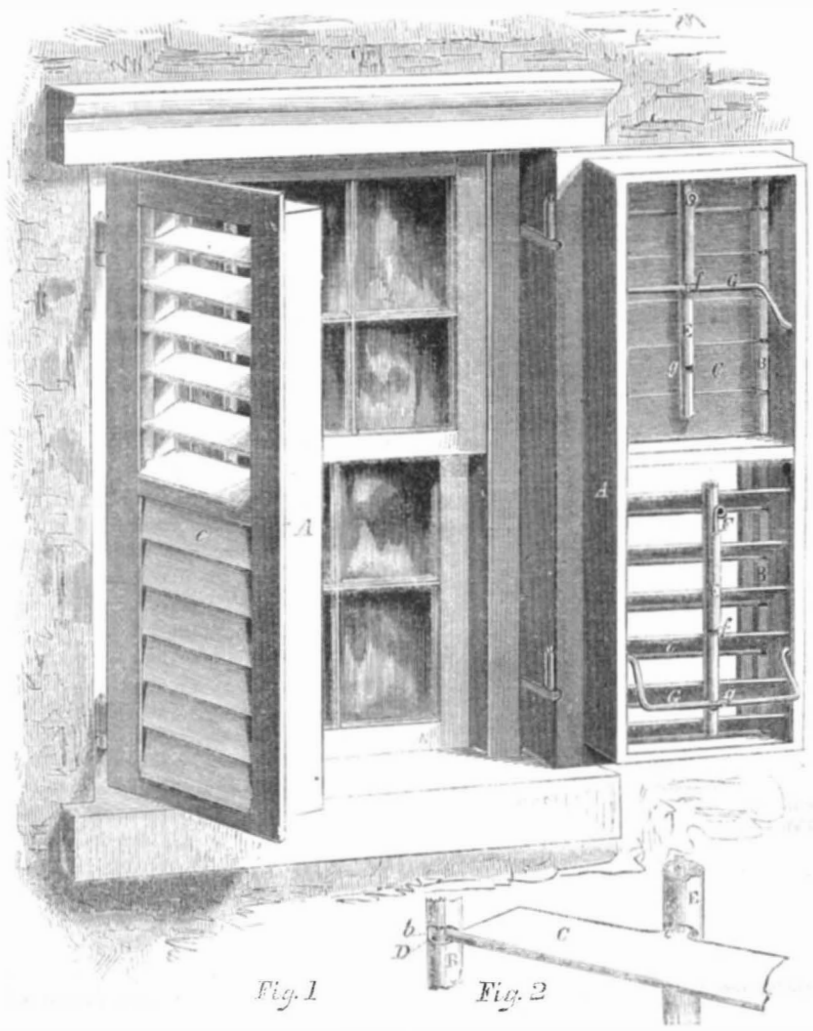
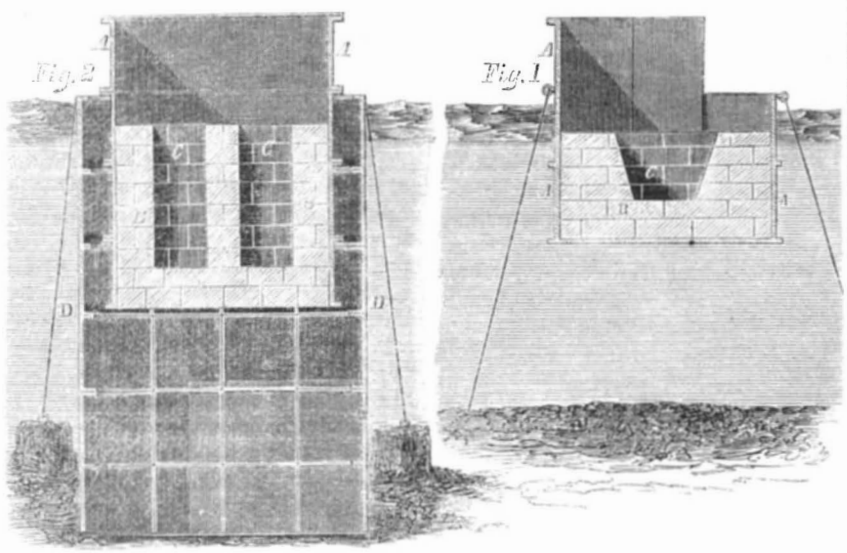


Fig. 1 Fig. 2

MODE OF CONSTRUCTING SUBMARINE WORKS.



This invention (which we transcribe from the London *Engineer*) relates to a mode of simplifying the construction of foundations of piers, harbors and other submarine structures. To attain this end, a floating caisson is formed of plates of cast or wrought iron, bolted or riveted together, and this floating vessel (which is open at the upper part) is brought over the spot which is intended to receive a large block of concrete or masonry. The floating vessel being moored in the required place, concrete is discharged into it, or brick or stone-work is built up in it, as required, and by the accumulation of such building materials in the vessel the latter is sunk to a given depth in the water. The sides of the vessel are built up by adding plates of iron to the upper part of the vessel, and thus its capacity and depth is increased—the upper edge of the vessel being raised considerably above the surface of the water.

Fig. 1 shows a section of one of the caissons in the course of construction. A A is the outer casing, made of sheets or plates of iron, bolted together by flanges or otherwise, so as to form a vessel open at top. B is the masonry or brick-work which is being built up inside, a vacant space C being left in the middle, to give buoyancy to the vessel while its construction is proceeding. When the weight of the masonry inside has sunk the edge of the vessel to within a yard or so of the surface of the water, an additional row of iron plates are secured on its top edge, so as to increase its hight and capacity, and when this has been completed, the masonry work is proceeded with as before. The building up of the vessel in this manner will be carried on until the bottom reaches the ground, and becomes firmly imbedded in it, when the vacant space C, will be filled in with concrete or rubble masonry. A modification of the above arrangement may be made by constructing the outer casing of sheet or plate iron, as before, but filling the interior with concrete, a vacant space being, however, left in the center of the vessel by placing a second cylindrical or other conveniently-shaped vessel within the first, so as to render the vessel buoyant until it reaches its seat at bottom. In constructing piers, harbors, walls, or any structure projecting out from the land into the sea, it will be evident that instead of mooring the caissons or vessels while they are being constructed and filled with masonry, they may be supported by cranes, or secured to crabs fixed upon the finished part of the structure.

The patentee describes in his specification several different plans for constructing the caissons or vessels inside a protecting shield, kerb, or outer vessel. Fig. 2 shows a vertical section of the simplest form of a protecting shield or casing. A A represents the inner vessel, B B the masonry or brickwork within it, and C C the vacant spaces, which are subsequently filled up with rubble, masonry, or concrete, as before explained. D D is the outer casing, constructed in the same manner as the inner one, but open at bottom, so that its lower edges may rest upon the ground and sink into it, if the ground is soft. By mooring this casing and sinking it on the desired spot, divers may be allowed to descend to the bottom and prepare the ground for the reception of the caisson or vessel which is to be constructed and sunk in it, after which the outer vessel may be raised and used for the next caisson.

Peculiarities of Bottle Glass.

Bottle glass is the cheapest kind, and made of ordinary materials; these are generally sand, with lime, and sometimes clay, and alkaline ashes of any kind. The green color is owing to impurities in the ashes, generally to oxyd of iron. This glass is hard, strong, and less subject to corrosion by acids than flint glass. For bottles containing the effervescing wines, great care is necessary in the making; the materials must be thoroughly mixed, when the mass is in a state of fusion, and the thickness should be uniform throughout, in order to resist the pressure of the contained carbonic acid. The loss of bottles by bursting, in the champagne trade, is from twenty to thirty per cent; a machine has been contrived to test their strength, which ought to be equal to bear the pressure of from twenty-five to thirty-five atmospheres. In bottles to contain acids, the alkali and the lime should be chemically united, to prevent action of the acid.

The Horse-Shoe Crab.

This animal, otherwise called the *Limulus*, or king crab, so common to our eastern coast, is not at all known in Europe except from the specimens and descriptions that have been sent over, and is one of the first animals that shows the naturalist from the Eastern that he is in the Western hemisphere.

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NEW YORK, JANUARY 2, 1858.

The New Board of Appeals.

As announced in our last number, Commissioner Holt has appointed a regular BOARD OF APPEALS, consisting of three Chief-examiners, whose exclusive duty will be to review all rejected applications that may be duly brought before them. The Board consists of Chief-examiners Thomas H. Dodge, DeWitt C. Lawrence, and A. B. Little. Their action will be as follows:—Whenever an application for a patent has been twice rejected, the applicant may, in person or by attorney, request a review of his case, on appeal, by the Commissioner. The Board will assist the Commissioner in this duty, by carefully examining and summing up each case for him, rendering to him a written report of the result or opinion to which they arrive. The Commissioner will then decide, finally, in every case, by approving or rejecting the report of the Board, as seems to him most proper.

The establishment of this Board is a movement of great importance. Its necessity has, for a long time, been clearly apparent, but never more so than since the advent of the present Commissioner. His frequently-expressed intention to administer the laws with a spirit of broad liberality, and his firmness in practically carrying out whatever he deems to be just and right, have had the effect to inspire confidence in him among the ranks of inventors and all classes. Where injustice has been done to them, they have not been backward in appealing to him for redress, and so far as within his power, they have never appealed in vain. Hundreds of rejected applicants have pressed their suits before him, and have come away rejoicing.

So large has been the number of appeal applicants, and so constantly are they augmenting, that the Commissioner has been utterly unable to review every case in person. It has, therefore, been his custom, as it was of his predecessors, to seek assistance by referring appeals to a special Board, consisting of two Examiners, selected at random from the examining corps. Whenever these Boards happened to be composed of liberal-minded Examiners, a result in harmony with the Commissioner's views was always obtained. But when, as was too frequently the case, the Boards were composed of certain old Examiners or jointly of one elder and one younger member, either injustice was likely to be done to the applicant, or a total disagreement took place. The elder Examiners would generally refuse to sanction the liberal interpretation adopted by the Commissioner, while the younger members would firmly insist in following the instructions of their Chief. The result was, that the labor of review was thrown back upon the Commissioner, and the system of reference, instead of being a relief to him, must, we think, have become a positive nuisance. In addition to the trouble occasioned by the disagreement of the Boards, the Commissioner received frequent complaints of injustice and illiberality on the part of the older members, and was constantly entreated by applicants not to refer their cases to them.

We commend the Commissioner for the calm patience that he has ever exhibited towards the refractory portion of the examining corps. We have often wondered that he did not at once remove them, and supply their places with men who were less disposed to array their personal opinions in opposition to his apparently plain rules. But the measure now adopted will probably restore harmony in the Office without recourse to such an extreme.

One of the most important effects of the creation of the Board of Appeals will be to render the practice and decisions of the Office *uniform*. The greatest incongruity has heretofore existed, because so "many men of many minds" have been allowed to have their say. Applicants have found by experience that the Office was in the habit of deciding one way to-day, but just the contrary the day following. Such results were productive of great mischief to applicants, while they also exposed the management of the Office to the jeers and contempt of the public. The Board of Appeals now appointed, if they pursue the course which has heretofore characterized their conduct as Examiners, will be the means of putting an end to all erraticisms, by introducing plain, systematic and uniform rules of action, to be applied inflexibly to every case that comes before them.

The selection of candidates to compose the Board of Appeals must have been a matter of the most serious consideration on the part of the Commissioner. The practice which they adopt will undoubtedly have an important influence upon the future prosperity and destiny of the Office. Their position is one of grave responsibility. They cannot exercise too much care or deliberation in settling upon the course which they are to pursue. In this matter they will doubtless be assisted by the mature counsel of the Commissioner. We could ask for nothing more.

While we rejoice at the opportune movement of Commissioner Holt in establishing the Board of Appeals, we would also express our unequivocal satisfaction of his appointments to that Board. His selection is in the highest degree fortunate. The appointees are all men of firm integrity, reliability, talent and liberality—the very persons whom applicants would select to hear their appeals, if the choice were left with them. Although belonging to the younger portion of the corps, they are gentlemen of long-tried experience and prudence as examining officers. Their past official action has always given satisfaction; their antecedents are well known. We are confident that they will not disappoint the high expectations that are entertained concerning them.

The course of Commissioner Holt in establishing and appointing this Board of Appeals is but another evidence of his peculiar fitness for the high office which he holds. The beneficial results of his official policy are already felt in every section of the country. If his life is spared, and the same policy continued, we predict that the Patent Office, under his administration, will reach a hight of prosperity and usefulness that it never before attained.

Artificial Illumination.—Burning Fluids.

The most degraded savage stands infinitely above the most intelligent of the brute species by the use of two discoveries, viz., fire and artificial light. The Esquimaux, in his dreary clime, cheers his ice-tent, during his long wintry night of six months, with light from the blubber of the whale; the Indian, in the dark tangled forest, lights up his wigwam with the blazing pine knot, or fat of the deer; and the civilized white man illumines his houses and cities with a subtle gas made from coal obtained from the bosom of the earth, or with some of the numerous hydro-carbon fluids.

Human life cannot be enjoyed without artificial light; if man were deprived of this agent, he would become a brute. In proportion as the means of obtaining artificial light are improved, and rendered accessible to the multitude, so, in proportion, is the mass benefited and elevated in a social capacity. As the light of the sun cheers the whole world, so does artificial light increase the happiness of those who possess it. The bright fireside sends a glow of cheerfulness through the whole family circle, and the sparkling chandelier, with its numerous burners, thrills a whole assembly. How warm and cheerful, on a winter's night, is the appearance of a city whose streets are well lighted, in comparison with the dull gloom which overspreads one of our villages slumbering in darkness! When we think of the vast extent of our artificial illumination, embracing as it does every house in the land, all the streets in our cities, and most of our villages, we must conclude that it forms one of the largest items of constant expenditure belonging to communities and families. To obtain the cheapest and best artificial light, therefore, is a question of no small importance. Our intention is to present some observations on the fluids used for this purpose.

Not many years ago, the only fluids employed in our country for household light were animal oils, obtained by perilous adventure on the stormy sea with monsters of the deep. At present, whale oils are in comparatively limited use for illumination, and are becoming more limited every year. Sperm oil has no superior among all the burning fluids, but it has become so dear that cheaper substitutes have been sought and obtained. The most common of these is a compound of alcohol and turpentine, commonly known by the name of *burning fluid*, which is very cheap and cleanly, possessing none of that greasy property which belongs to oils. This fluid was first brought into public use in 1830, when a patent (now expired) was obtained for it by Isaiah Jennings, of New York City. It is composed of about nine parts of highly rectified alcohol, and one of camphene, and is capable of burning in common lamps; were it not so volatile, no burning fluid could be more desirable. From its very nature, however, it must be used with great caution and care, because it is so liable to evaporate and become explosive by mixing with the atmosphere. Horrible accidents, causing death in many instances, have occurred from the explosion of lamps since it came into use, hence a safer substitute is desirable.

From some kinds of bituminous coal a subspirituous oil is now manufactured, which is fast coming into popular favor, owing to the improvements which have recently been made in the means of purifying, and in the lamps designed for burning it. It is but a few years since it was first discovered that oil could be distilled at a low temperature from rich cannel coal, and now this oil is almost exclusively employed for lubrication in Great Britain, while it is extensively used both for lubrication and illumination among our people. Vast beds of the rich coal from which this oil can be obtained exist in Pennsylvania, Ohio and Kentucky, affording sources of supply for thousands of years to come. This oil passes over in a very crude state, incapable of being generally employed for burning on its first distillation; but by the use of sulphuric acid, the bichromate of potash, several washings and distillations, it is purified so as to afford a most brilliant light in an argand burner. Coal oils are very peculiar; a very clear oil will come over in small quantities at a comparative low heat during distillation; then as the temperature is raised, a greater quantity comes over, but it is thick and viscid. All these oils are liable to become red in color by exposure to the air, and they have an offensive odor.

Rectified turpentine, under the name of *camphene*, which is very cheap, has been tried for illumination, and judgment passed against it. It requires, like coal oil, an argand burner, and even with the greatest care it is liable to smoke, and fill up the meshes of the lampwick with resinous matter. Rosin oil, although very cheap, labors under the same disadvantages.

It is a remarkable fact that while all the animal oils may be burned in common lamps, very few of the vegetable oils can be so used. The great defect of most vegetable oils for burning is their gummy nature, which causes them to clog up the meshes of the wick, and give out only a dull reddish and smoky light. The two vegetable oils capable of burning, in lamps, are made from the olive, and the seed of the *brassica napus* (rape seed). This oil is capable of rivaling sperm for giving a brilliant light. Patents have been taken out for purifying linseed, cotton seed, and sunflower seed oils, to adapt them for artificial light, but hitherto none of them have come into general use; the processes pursued to purify them have either been inefficient or too expensive. Neither the olive nor the rape are cultivated for oil in our country, yet the former may and should be, for its beautiful oil, in our southern States, and the latter for the same objects in all our States. In France and Germany, rape seed is extensively and profitably cultivated. The oil exists ready formed in the seed and is extracted by pressure, like other oils obtained from seeds. The seed is first ground to meal, then heated to 200°, placed in bags, and submitted to very severe pressure. As the oil comes from the press, it contains some mucilage, which must be removed to fit it for burning. This is accomplished by stirring about two per cent of vitriol among it, washing with water in vats, and afterwards filtering it. The sulphuric acid unites with the mucilage of the oil, and falls down as a heavy precipitate; the oil floats on the top of the water after standing a few days, and is then drawn off by a siphon or tap. This oil, which can be employed in common lamps, illumines the lighthouses on the French coast, which are said to be the best lighted in the world. It is, at least, an oil to which we wish to direct attention, in order to induce some of our people to introduce a useful manufacture.

We are well aware that, several years ago, at the suggestion of the Lighthouse Board, a quantity of rape seed was imported, and was distributed through the Patent Office for culture; but in our opinion, the experiments made to cultivate it were not properly conducted, or else the Lighthouse Board would have been supplied with *colza* oil (as was their object) before the present time. As this oil is of a superior quality for lamps, neither one failure nor a number of them should discourage efforts for its development among our people.

A New Year's Gift.

This festive season, mixture as it is of so much joy and so much sadness, will in a few days be upon us, and we must prepare to give young 1858 that reception which an untried year in Time's great line deserves. Present-making will be in fashion, and we would call the attention of our readers to the SCIENTIFIC AMERICAN as a suitable present for employers to bestow upon their apprentices, fathers on their children, and mutual friends the one to the other. It cannot do harm, and must do good, for the weekly reception into a household of a journal containing nothing but sound, pure, and pleasant information, is an advantage, the results of which cannot be too highly estimated. We would also advise those who have not yet subscribed on their own account, to do so at once; there is no better time than the present, and it would be beginning the New Year well to secure to themselves what our readers call "the most useful journal of the day." In conclusion, follow our advice and you cannot fail to have that which we earnestly wish you, namely,

A HAPPY NEW YEAR.

Malic Acid.

This acid is found in apples and the juices of similar fruits, and is also present in the mountain ash and garden rhubarb, to which it gives the peculiar tartness that is so agreeable to the palate. It is capable of being separated by the processes of the laboratory, but in its pure state no useful application has been found for it, although we think it might advantageously be employed in the manufacture of those summer beverages in which a sweet tartness is so cooling and agreeable. The difficulty attending its preparation may perhaps for some time prevent this, but that it will be more generally used we do not doubt.

Our Prizes.

The names and addresses of those who have succeeded in obtaining the fifteen largest lists of subscribers to our present volume will be duly announced in next week's issue, together with the number of names furnished by each and the sums of money to which they are respectively entitled.

Our readers will please to bear in mind that our paper goes to press a few days previous to its actual issue, hence the necessity of the delay in the announcement. The lists, however, are closed on the 1st of January.

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Butter-making and Butter.

One of our lady correspondents requests us to give some account of "butter-making"—how and when butter was invented—stating that such information would be interesting to many of our readers.

The origin of butter-making is unknown. From time immemorial butter has been made and used by the natives of Western Europe. Little is said about it by ancient writers. Galen and others do not mention it as an article of diet, and it is probable that neither the Greeks nor Romans employed it in cookery, nor set it up on their tables as food, in the same manner as it is enjoyed by us. As butter melts and becomes liquid at 90° Fah., this may account for the ignorance of ancient authors as to its use in cold countries in their day, because the seats of ancient learning were confined to warm climates, and geographical knowledge was then very limited. Through the indomitable courage and enterprise of modern travelers we have been made acquainted with the customs and habits of almost all tribes and nations—civilized and savage—so that we know of butter being used among many of the barbarous Arab and Tartar tribes inhabiting mountainous regions; and no doubt it has been known to them for many centuries. The Tartar, carrying milk for his frugal meal in a leathern pitcher slung over the crupper of his saddle, would perceive, after a hard ride, that there had gathered on its surface a rich yellow substance, unknown to him before, and which could have been produced from the milk alone. The cause of its development would readily suggest itself, and its pleasant flavor would incite him to reproduce it in the same manner. This is the way butter is now churned by some of these nomadic tribes. The milk is placed in a bag made of skin; the Tartar slings it across his saddle, mounts his steed, and trots up his butter. This, we believe, could not have been the way butter was first discovered by the inhabitants of Western Europe, as their most ancient practice of churning consisted in agitating the milk in wooden vessels; but how or when they discovered the art, we shall never know.

In Palestine, and other warm countries, olive oil holds the same place that butter does with us. As an article of diet, we are only acquainted with the butter made from cow's milk; but butter made from the milk of the sheep, goat, buffalo, and ass are known and used in various countries, especially in Asia. Some tribes of Arabs use the butter (called *ghee*) of the buffalo, which they drink clarified in a liquid state. In the East Indies there are breeds of goats which give a large quantity of milk; and among the hill tribes of the Himalaya mountains they take the same place as the kine tribes with us. One of these goats, lately brought to this city from Calcutta, (and by a Mormon family, strange to tell!) yielded on shipboard from six to eight quarts of milk daily. We really hope that some of our enterprising agriculturalists, who have devoted so much attention to improving live stock, will endeavor to introduce and acclimatize such a valuable breed of animals. They can be raised and fed in mountainous regions where cows would starve. Their milk is good, their flesh excellent, and their hair makes strong and durable fabrics for cold weather. Goats' milk and butter are also common in some parts of Europe.

Butter is the oil of milk, separated by the mechanical action of churning, from its other constituents—casein, sugar, and some salts. It exists ready formed in the milk, as oil does in various seeds, and it can be churned from sweet (but not so quick) as well as from sour milk. It is called by chemists *butyrine* and *butyric acid*. In some dairies the whole milk is churned to obtain the butter; in others, only the cream. By the former method it has been asserted that more, but by the latter, superior butter is produced. It is our opinion that with proper care there is little difference in the results of the two systems. Grass-fed kine yield milk from which beautiful yellow butter is gathered; on the contrary, stall-fed cows give milk which yields a tallowy-looking butter. This latter kind of butter is oftentimes colored to deceive the buyer, by annatto, the juice of carrots, and the flowers of the marigold. The color, therefore, is not always the test of grass-fed milk. Some kinds of feed impart their strong and peculiar flavor to milk. This is the case with turnips, which should never be given to milch cows, except in very limited quantities. In winter, when grass cannot be obtained, the best kind of food is a question of no small importance. Milch kine should receive at least one meal per day of steamed or boiled food. The cheapest and best for this purpose are indian meal, a few pumpkins deprived of their seeds, carrots, hay, and cornstalks; potatoes are excellent, and when cheap should be given freely. Cows which receive one meal per day of boiled or steamed food, during winter, yield at least one-third more milk than those which receive only dry food, the condition of the former at the same time being much superior.

Much has been said about the best methods of treating butter to preserve it sweet and from becoming rancid, under ordinary circumstances. There is no difficulty at all in the matter; and yet the quantity of inferior (bad butter) in proportion to good butter which comes into market, is immensely large. As all healthy, well-fed country kine, produce good milk, no bad butter should be found in our markets. It reflects unfavorably upon the intelligence and thrift of our farmers that such butter is offered for sale. Cleanliness and care are two of the great secrets for making good butter. Holland butter has the highest reputation of any other; this is simply attributed to the great cleanliness of the people of that country, but there are other conditions also necessary. The dishes containing the milk should be perfectly clean, and kept in a cool, dry, and well-ventilated apartment, and the milk or cream which is designed to be churned should never be suffered to become very sour—to have the least odor of putridity. It has been discovered that butter made from sour cream is very liable to become rancid, in comparison with that made from sweet milk, or sweet cream. It is, perhaps, owing to want of attention on this head, during warm weather, that so much inferior butter is made. It requires longer time to churn fresh than sour cream; but the quality of the butter obtained will pay for the use of horse power to churn, even on a farm having no more than five cows. After the butter has *come*, it requires careful manipulation, or working. It makes it tough to work it over a great deal, and the use of much water for washing takes away its fine flavor. The best plan to treat butter is to submit it first to severe pressure, by placing it in a cloth, and squeezing it in a vessel containing a perforated false bottom. This can be done with a cheese press, if not, with a pounder like that employed for clothes. After all the milk is thus squeezed out, the butter should be lifted and worked over carefully, and afterwards receive one or two clean, cool waters, to wash away every trace of milk. It should then be salted with the best salt, containing a minute quantity of white sugar mixed with it, and last of all it should again be submitted to severe pressure. The great object in thus treating butter is to remove all the water and milk from it, because these induce incipient decomposition and consequent rancidity. By churning the cream before it becomes too sour, and removing all the water and milk from the butter, and by careful and thorough salting and working, the best quality will always be obtained.

Book-making.

Book-making must be classed among the fine arts, for indeed it is an art in itself, whether we consider it in its exterior or interior decoration. The English excel all others in the tasty arrangement that is required in a really exquisite work. They understand it in all its minutiæ. The very title-page is a model of neatness and elegance; and of such importance is the superintendence of this labor, that artists, trained men in their vocation, are employed in most of the large establishments to attend to it in all its artistic capabilities. The art has been carried to a high degree of excellence and finish in France. Many have acquired great renown there in this department of handicraft. The French books are remarkable for the firmness of their boards, the smoothness of their leather, and the delicacy, the richness of design, and the sharpness of outline of their gold tooling. The designs upon one of Beauxonnet's copies or Lortios' books seem hardly to be stamped upon the leather, but rather to be inlaid in it. But for pleasure and convenience in use, the work of the French binders is inferior to that of the English, as books bound by the former are very stiff—that is, they open with difficulty, and require constant pressure to keep them open. No nation, however, can compete with America in the all-important item of cost. We make our books to sell, and to be read, and not to be laid on the drawing-room table, to have merely their outsides admired and their contents disregarded.

Is Charcoal liable to Spontaneous Combustion?

Messrs. Editors—I enclose a paragraph cut from the *Evening Bulletin* of Saturday last, respecting the spontaneous ignition of powdered charcoal when damp. This has greatly surprised me, and I cannot credit it. In several places in my woolen mill where steam pipes were exposed to the cold air, I protected them by wooden boxes filled with powdered charcoal; and in one place particularly, I know that the dropping water from a cock kept the charcoal wet, yet there has been no ignition. I preferred charcoal to sawdust or hemp, or cotton, for the reason that I believed the heat of the pipes would not ignite it, nor dampness produce that effect; but if certain chemists of Philadelphia are correct, there is danger, and I beg your opinion on the subject, having confidence in your judgment.

* * *

Norristown, Pa., December, 1857.

[The following is the paragraph referred to:—

"The Origin.—Fire Detective Blackburn has made a careful investigation into the cause of the recent fire at the freight depot of Davis & Steel, Market st., above Eighth. It seems that there were several bags of powdered charcoal stored in the car-house; and several chemists whom Mr. Blackburn has consulted state that powdered charcoal, when damp, is liable to spontaneous combustion. The atmosphere was very wet at the time of the fire, and the coal, no doubt, absorbed considerable moisture. As the fire made its first appearance in the precise spot where these bags were stored, the strong probability is that it originated from spontaneous combustion."

It is our opinion that the fire alluded to in the above extract was not caused by the spontaneous combustion of powdered charcoal; and we will hold to this opinion until some of those Philadelphia chemists or other persons afford us satisfactory proof that charcoal in powder, either in moist weather or when wet with water, will spontaneously ignite and burn. We have seen charcoal dust exposed for long periods of time to moisture and the atmosphere, and never knew an instance of spontaneous combustion caused thereby. We do not doubt that impurities (such as pyrites) ground with charcoal into dust, may, when moistened with water, generate sufficient heat to induce spontaneous combustion in the coal; but we mean that good common charcoal could not have produced the results specified in the above paragraph. There are many curiosities in chemistry, and the above may be one of them; but it has generally been held that carbon-charcoal will not burn, nor unite chemically with oxygen under a red heat, to produce combustion.—Eds.

A Dial Thermometer.

Messrs. Editors—Mr. Simeon Halton, of this place, an ingenious mechanic, has just brought out a dial thermometer, in which the use of liquid of every kind is dispensed with. The instrument is about the size of a common watch, (which it very much resembles,) only it is not quite so heavy. It is self-registering, and may be carried or placed in any position without affecting the accuracy of its indications or the arrangement of its parts, which are very firm, and not liable to get out of place. It is very sensitive, and capable of indicating with perfect accuracy any degree of heat or cold, showing with the same facility the temperature of the boiling-point and that of the poles. The dial may be made of any desired size, and either of the thermal scales placed thereon. Such are the claims of its inventor; and the tests to which it has been subjected thus far fully sustain them.

T. H. McLeod.

Middlebury, Vt., December, 1857.

[We seldom pay attention to notices which are frequently sent to us respecting new inventions, made here and there throughout the country, especially when they come merely as commendatory testimonials, without descriptions of the inventions. The above has come to us in this shape, but nothing of the mere puffing style, we are sure, was intended by our correspondent. His letter deserves attention, from the very nature of the subject. If Mr. Halton has invented a solid thermometer which can measure low temperatures equally as well as high temperatures, then he has accomplished a most important object. If not, he has invented nothing new or important, as dial solid thermometers, for measuring high degrees of heat, are old and well known.

All bodies expand by heat, and contract with cold. The above mentioned thermometer, we presume, is made of a coiled slip of metal; but while some solids are better than fluids for measuring high degrees of heat, they are inferior for measuring low degrees, owing to their small amount of contraction at low temperatures. They are also not so good as the usual fluids, mercury and alcohol, for constant *common* service, because, by very frequent expansions and contractions under heat and cold, the metal soon loses its elasticity, and becomes incapable of performing its functions accurately. Solid thermometers called *pyrometers*, have long been empleyod for testing the heat of furnaces, and the melting point of metals. The most improved instrument of this character, we believe, is that of Professor Daniels, of London. The part of it on which the heat acts is a small round platina rod, placed within a tube of baked graphite, and secured by one end to its bottom. To the other end of this rod is attached a fine platina wire, which passes twice round the axis of a wheel, and is fastened to a spring to maintain its tenison. The teeth of the wheel on this axis take into a pinion, on the axis of which is a pointer, the movements of which around a stationary dial indicate the expansion and contraction of the platina rod, and the consequent degrees of heat to which it is exposed. It is a dial solid thermometer. That of Mr. Halton may be different in construction; but if it can measure very low degrees of temperature as well as mercury, it is certainly superior to the pyrometer of Professor Daniels.—Eds.

Practical Application of Volcanic Matter.

The waters of the Bay of Volcano (in the island of Santorian, twenty-six leagues north of Candia,) have the singular property of cleansing the keels of ships. These waters have a fetid smell, and in calm weather, jets of a reddish kind of water are seen issuing from the bottom, as if caused by some secret volcanic agency. Hence it may be presumed that a strong current of sulphureted hydrogen gas is generated, which combines with the oxyd of copper of the sheathing, transforming it into a sulphuret; and as it is the oxyd which cements the shells and weeds together, its transformation destroys their cohesion.

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Correspondents

B. & F., of Me.—A patent was granted in England, in 1824, to W. H. James, for precisely the improvement you describe, viz., placing the drivers on separated axles, each having two cranks at right angles to each other, driven by separate pistons and cylinders. This device was applied to a locomotive for common roads, and this would be a sufficient ground for the refusal of a patent, for the application of the same thing to a railway locomotive, even if it has never been proposed to apply it on railways, which we think doubtful. Some locomotives patented by R. Stephenson, (the great English engineer,) having three cylinders connecting with three cranks on one driving shaft, were tried in England about ten or twelve years ago. The object to be accomplished by this was partly the same as that which you desire to obtain; but the invention was never extensively used.

W. H., of Ill.—It is possible to decompose steam by passing it through red-hot iron tubes. This is not, however, effected entirely by the agency of heat, as heat alone can never effect the decomposition; but the oxygen of the steam is caused to combine with the iron and thus the hydrogen is set free. To effect the decomposition of steam by heat, the pipes must be made of some material having a great affinity for oxygen, which affinity will be increased by heat; or they must contain some material—which must be renewed from time to time—possessing the above characteristics. Many experiments of the kind you describe have been tried, both with a view to the use of the gases as a motive agent, and as fuel, but with not much success. A patent was recently granted for an apparatus for decomposing the exhaust steam from an engine in the furnace, and burning up the gases. We cannot say that your idea of decomposing the steam in the tubes, and keeping the tubes heated by their combustion, has been fully anticipated, but we do not regard it as having the slightest approach to practicability.

E. C. M., of ——.—Your theory regarding the spots on the sun being huge chunks of planets, broken by collisions, and precipitated on the disk of the great luminary of day, is certainly new, but we fail to gain from it any more light on those spots. Your opinion that the moon once occupied the position now filled by the Pacific Ocean, and that it was projected from the earth to its present position by a terrific explosion, is also new, and as droll as it is novel. The explosion must have been one of no small magnitude, and Mother Earth must have kicked back considerably after discharging such a respectable sized bullet a distance of 237,000 miles. Talk of the monster cannon of modern days, and Lancaster guns, after such an exploit of ancient gunnery—it's all moonshine.

J. N. T., of Ill.—In answer to your inquiries respecting the "Paine light," you are perfectly correct in your views regarding the general construction of the apparatus by which Paine asserted he could decompose water and resolve it into a single gas, capable of giving a brilliant light, but the whole affair was a complete failure. The apparatus could not decompose water, nor could he obtain a good white light from the gas of the water, even if he had decomposed it in the manner he described. Water had been decomposed long before he professed to have made the discovery, by currents of electricity, generated by revolving helices in the magneto-electric machine; but no useful application can be made of this scientific fact, owing to the great cost at which the hydrogen of the water is thus obtained, and because it has to be carbonized with camphene or naphtha after it is generated, as without carbonization it produces only a dull blue flame.

W. F. W., of Philadelphia.—We are not acquainted with a cement for mending glass that will remain fluid when cold, and be clear and resist the action of heat and moisture when dry. The common diamond cement for glass and china is composed of isinglass soaked in water until it becomes soft, then dissolved in proof spirit, to which a little mastic dissolved in alcohol is added.

G. H, A., of Wis.—You will find a description of the process for manufacturing glue on page 259, Vol. 11, Scientific American.

S. M., of Del.—We do not know of any one who would take an interest in your invention abroad. Your best course would be to get some one with whom you are acquainted to aid you.

J. A., of Ohio.—Your cornstalk cutter could not be made profitable under foreign patents. Indian corn is not much cultivated in European countries. There is scarcely a stalk of it grown in England or France.

S. C., of N. Y.—We are really at a loss to know what you mean by stating that you are prepared to defend the theory in the article published, viz., "which are the best—plain or ornamental stoves?" You surely do not mean that iron below a red heat will decompose air. That is the only point in question.

A. W., of Me.—We do not see what advantage is to be obtained by the use of a tube 300 or 400 feet long, to conduct the Atlantic cable from the stern of the vessel. A tube that will conduct it into the water, in our opinion, is sufficiently long.

M. C. M., of D. C.—Your communication has been received, and will meet with attention.

J. A. M., of N. Y.—The office of the *Scottish American Journal* is No. 111 Nassau st., this city. It is, as you truly remark, an excellent newspaper.

C. F. A., of Mass.—Stick molasses candy is made by drawing it, while pretty hot, between the hands, until it is quite cool. The drawing, doubling, and twisting of it changes its color, from black to yellow, and renders it more tough. Flour is sometimes intermixed with the mass, but it adds nothing to its quality.

J. C., of Ohio.—To enable us to get up an engraving of your corn planter we shall require a model. The expense will be $12. We do not print circulars.

W. H., of N. Y.—You can procure a pamphlet containing the copyright law of Baker, Godwin & Co., of this city.

J. M. W., of Oxford.—We do not think there is any chance for a patent on your proposed method of adjusting maps by means of cords and pulleys. Substantially the same thing has been used for this purpose.

Money received at the Scientific American Office on account of Patent Office business, for the week ending Saturday, December 26, 1857 :—

M. C., of Mass., $25; W. H. A., of Ga., $25; S. L., of L. I., $30; J. & S. P. P., of N. J., $30; H. & S., of Ill., $30; R. H. K., of N. Y., $30; L. B. S., of Conn., $30; F. N., of L. I., $50; W. & S., of Mass., $30; W. D., of Pa., $25; G. L. D., of Pa., $25: H. D. B., of N. Y., $30; F. L. W., of S. C., $25; W. R. L., of Conn., $25; W. G., of N. Y., $30; L. S. C., of N. Y., $30; F. C. G., of N. J., $10; L. C. W., of N. C., $25; L. L. N., of Mich., $25: L. E., of Mich., $75; L. R., of Mass., $15; B. M., of N. Y., $15; J. McA., of N. Y., $40; R. R., of N. Y $25.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, December 26, 1857 :—

B. M., of N. Y.; R. R., of N. Y.; G. L. D., of Pa.; W. D., of Pa.; W. H. A., of Ga.; M. C., of Mass.; J. H. F., of Cal.; W. R. L., of Conn.; F. L. W., of S. C.; L. C. W., of N. C.; J. McA., of N. Y.; L. L. N., of Mich.

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*** All advertisements must be paid for before inserting.

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Yours, very truly, CHAS. MASON.

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GEORGE W. OLIVER, Millwright.
Berlin, Nov. 19, 1857.
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The experiments which we give this week are both performed with an apparatus found in almost every house, namely, a tobacco pipe. Simple as this little article of luxury is to too many, it will serve for many purposes of amusement besides the special one for which it is designed; two of its uses we will now describe.

Take an allspice, or a pea is better, and through its center thrust a pin or needle, so that there shall be an almost equal weight of metal on each side; then place one end of the pin in the stem of a tobacco pipe, and applying the lips to the bowl, blow gently, when the pin and allspice will dance in the air in a very amusing manner. You may not succeed the first few times, but as soon as you have learned to keep the pipe quite steady, and to give a continuous current of air, you will be able to make the pin and allspice dance for a considerable time.

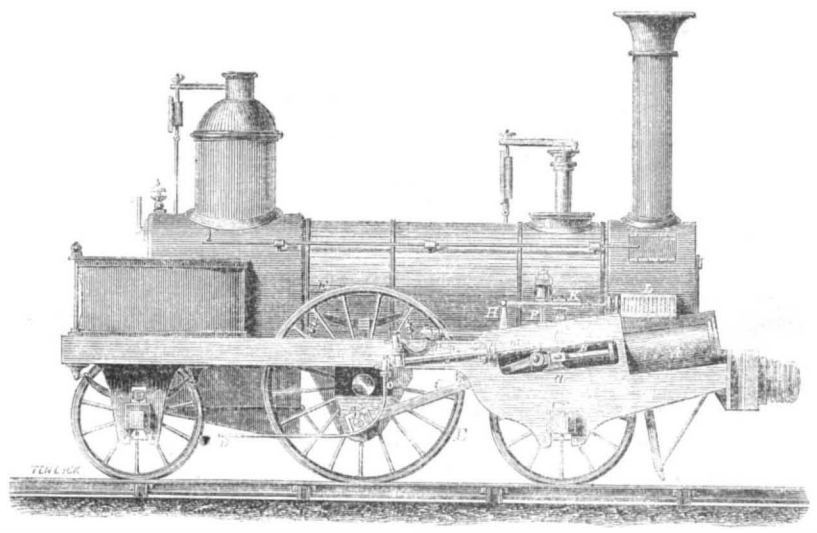
The bowl of the pipe forms a receptacle for condensing the air, and acts like the equalizing chamber of a force pump, by which continual pressure is exerted, and a stream of air passes through the stem to the orifice at the mouth of the pipe; here meeting with the allspice, it blows it up a little way, and then the allspice falling again by its own gravity, is met by another jet of air, and so is kept dancing up and down. "But," we are asked, "why does it not tumble away from the pipe, and not meet the next jet of air?" Because, when the air issues from the pipe it has a tendency to spread itself out, and so forms a kind of cushion, gradually increasing in dimensions and diminishing in power; and besides, if it is blown up straight, it will be sure to take the nearest way to the ground from the point where it stops going up, and that is always a straight line; but if you blow it out at an angle, it will surely fall to the ground, as you will probably find out during your experiments.

The next illustration shows a simple way of making illuminating gas by means of the same apparatus—a tobacco pipe. Bituminous coal contains a number of chemical compounds, nearly all of which can, by distillation, be converted into an illuminating gas; and with this gas nearly all our cities are now lighted in the dark hours of night. To make it as represented in our engraving, obtain some coal dust, (or walnut or butternut meats will answer,) and fill the bowl of a pipe with it; then cement the top over with some clay, place the bowl in the fire, and soon smoke will be seen issuing from the end of the stem; when that has ceased coming, apply a light, and it will burn brilliantly for several minutes; after it has ceased, take the pipe from the fire and let it cool, then remove the clay, and a piece of coke will be found inside; this is the excess of carbon over the hydrogen contained in the coal, for all the hydrogen will combine with carbon at a high temperature, and make what are called hydro-carbons—a series of substances containing both these elemental forms of matter.

Alcyone.

M. Maedler, the author of the recent investigations with reference to the central sun, has long been known to the astronomical world as the successor of M. Struve in the direction of the observatory at Dorpat. His computations of the orbital movements of the double stars have given to him a deservedly high celebrity; and the great theory which he has propounded is only given to the world after a long and patient examination, extending through many years. Assuming Alcyone as the great center of the millions of stars composing our astral system, and the direction of the sun's motion, as determined by Argelander and Struve, he investigates these consequent movements of all the stars in every quarter of the heavens. Just where the swiftest motions should be found, there they actually exist, which demonstrates either the truth of the theory, or exhibits the most remarkable and incredible coincidences. After a profound examination, Maedler reaches the conclusion, that Alcyone, the principal star in the group Pleiades, now occupies the center of gravity, and is at present the sun about which the universe of stars composing our astral system are all revolving.

THE EUROPEAN LOCOMOTIVE.



It will no doubt be interesting to many of our readers who have never crossed the Atlantic to be shown the picture of a European locomotive, and it may also serve to remind those who have visited the Old World of many pleasant trips on foreign railways. The chief points of difference between the general outline of our engraving and the locomotives which we see daily on our own railroads, are: the want of a cow-catcher, the absence of a spark-arrester on the chimney, and the want of covering on the driver's platform, and the reason why these are not needed may be easily explained. European railways are all well-fenced on each side, and in some places protected by high walls, so that it is almost impossible for any animal to stray on to the road, unless through the carelessness of its owner; therefore the cow-catcher is not needed. Again, the majority of European locomotives burn coke of the very best quality, and, in some cases, a mixture of coke and the finest bituminous coal; no wood ever being used, a spark-arrester is unnecessary. As to the last point, a covering for the driver, the French, Belgian and British railway companies are gradually adopting the American system, and providing a suitable shelter for the persons employed on the engine.

It is customary in Europe to use particular engines for special purposes; thus, one will be used for drawing the "express" train, another for drawing the ordinary one, while a third will be devoted exclusively to the traction of merchandise and freight, and receives the name of "goods engine." Many of these latter are monsters, weighing more than sixty tuns; on one railway there is an engine weighing nearly one hundred tuns, and of proportionate power. The "express" engines are made as light as is compatible with safety, and are intended to run very fast; thus on the Great Western Railway of England, where the rails are six feet apart, or as it is called the "broad gage line," sixty miles an hour is not at all an unusual speed; but taking all trains and including stoppages, the average rate in Britain is about thirty miles an hour, and on the continent of Europe about twenty-five miles an hour.

The principal European manufactories of locomotives are at Wolverton, Crewe, Newcastle and Swindon, in England; many are made at Glasgow, Scotland, and Liege in Belgium, which latter city has not inaptly been called the "Birmingham of Belgium." Although somewhat lighter-looking, they are really more heavy and cumbersome than our own; and not being partly mounted on a movable carriage or truck, but being firmly fixed on a rigid frame, they are not so well adapted to turn short curves. A great quantity of polished metal is seen on their exterior, and, with the exception of the boiler which is usually colored green, and the chimney which is generally black, there is little paint used in their outward decoration; but a very pretty effect is produced by the contrast of the white steel and yellow brass which enter largely into their construction.

Our engraving illustrates one of the most modern of the European "express" engines, and may be taken as a type of them generally. In it, A is the cylinder, of which there are two, one on each side, inside the frame, slightly inclined to economize space. The piston of each cylinder has its piston-rod, B, directed in its motion by the slide bars. *a a*, fixed to its extremity. This piston rod is joined to a connecting rod, C; which links on to a pin, D, fixed on the driving wheel, E, at a certain distance from its center, thus forming a crank. The rate of motion of the piston governs the rate of the driving wheels, and the two cranks (one on each side) with their pistons are placed at right angles to each other, so that there may be no dead center in the machine. H is a bell crank connected with an eccentric on the shaft of the driving wheel, that by the action of the rod, K, governs the admission of the steam into the cylinder, and changes its direction from the steam-chest to which steam is admitted from the boiler through a valve in the steam dome.

There is also attached to the crosshead, a complementary piston, *m*, which works in the pump cylinder, *n*, and draws water through the tube, *o*, which is connected to the cistern on the tender, and forcing it through the pipes, *p*, *P*, keeps a continual supply of water in the boiler. There is usually one large driving wheel, and two smaller ones, which directly support the frame with the intervention of strong springs to reduce the jar of the road. In some of the engine-houses of Europe, as many as fifty engines may be counted, some breathing forth steam after having done their work, and others sending forth volumes of smoke preparatory to doing theirs. Many of them are now provided with an additional improvement, namely, a steam break; and Mr. McConnell, of Wolverton, the superintendent of the locomotives on the London and North Western Railway, has obtained a number of patents for various modifications in the construction of brakes, applying them to the wheels of the engine itself, and not, as common with the hand-break, to the tender and cars only. The boiler being made of wrought iron plates, and having copper tubes from the fire-place to the smoke chamber, is covered with felt or some good non-conducting material, and then bound round with slats of wood and hooped like a barrel, and this prevents a great amount of radiation, and consequently economizes fuel.

In the European and American locomotives and railroads, there is still much to be improved and perfected; we might learn from one another with advantage, and those points of fault of which neither of us are at present cognizant, but which will gradually develop themselves as railroads progress, we believe will readily and easily be reformed by the inventive genius of the Anglo-Saxon race. In fact, the history of any road, from its conception to its perfect working, is one continuous record of patience, perseverance, daily toil, and nightly thought; and when the first train of cars runs on its level rails, they are triumphal cars demonstrating another victory of Mind over Matter.

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